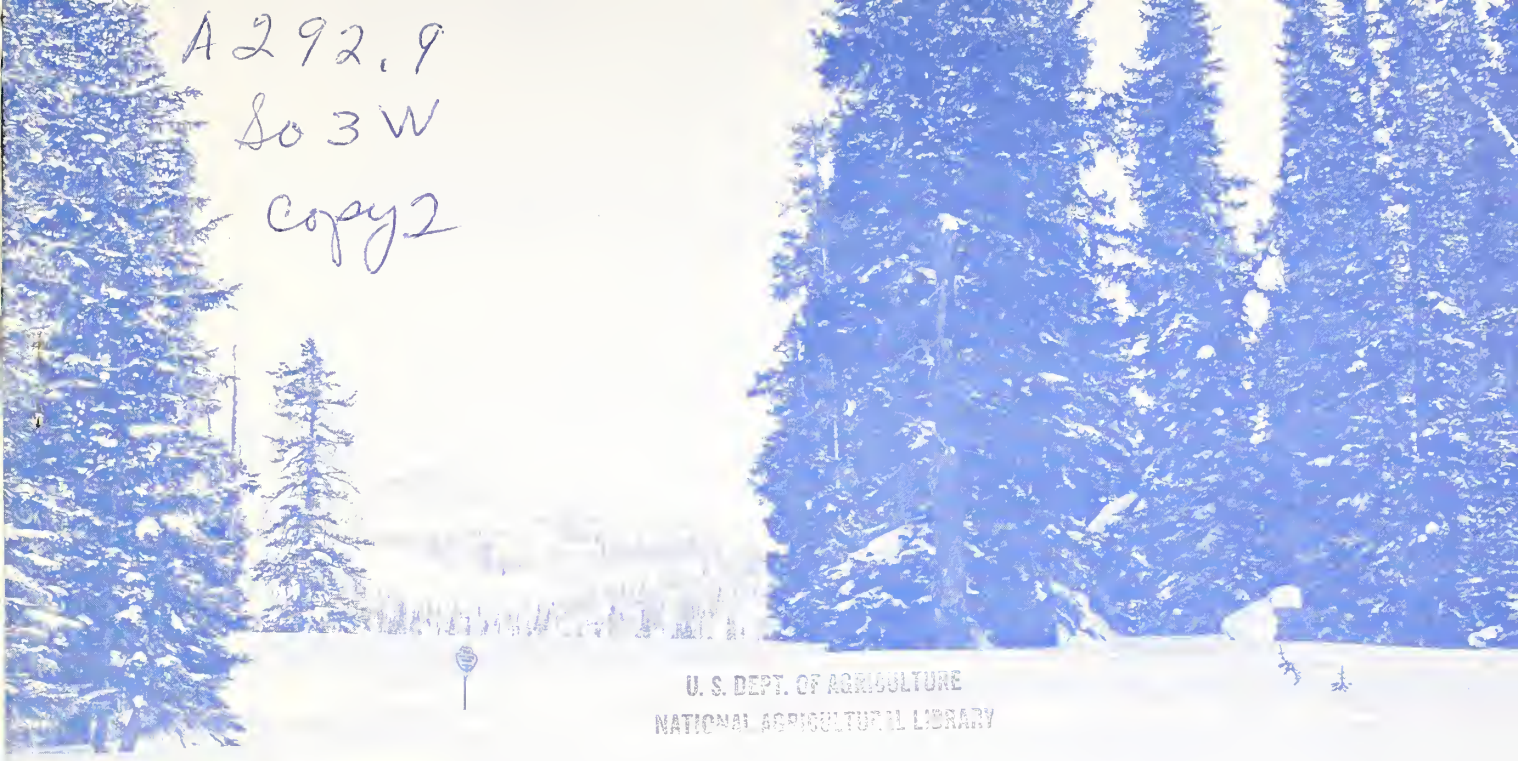


WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES

Including Columbia River Drainage in Canada

and

FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE
Collaborating with
CALIFORNIA DEPARTMENT of WATER RESOURCES
and
BRITISH COLUMBIA DEPARTMENT of
LANDS, FORESTS and WATER RESOURCES

AS OF
MAR. 1, 1968

TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Mast of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflaw forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season as they affect runoff will add to be an effective average. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same locatian near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are abaut 1400 snaw courses in Western United States and in the Columbia Basin in British Columbia. In the near future, it is anticipated that automatic snow water equivalent sensing devices along with radio telemetry will provide a cantinuous recard of snow water equivalent at key locotions.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data or reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are alsa included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

PUBLISHED BY SOIL CONSERVATION SERVICE

D. A. WILLIAMS, Administrator

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies af the reports for Western United States and all state reports may be obtained from Soil Conservation Service, Western Regional Technical Service Center, Room 507, 701 N. W. Glisan, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	P. O. Box "F", Palmer, Alaska 99645
Arizona	6029 Federal Building, Phoenix, Arizona 85205
Colorado (N. Mex.)	12417 Federal Building, Denver, Colorado 80202
Idaho	P. O. Box 38, Boise, Idaho 83707
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1218 S. W. Washington St., Portland, Oregon 97205
Utah	4012 Federal Building, Salt Lake City, Utah 84111
Washington	360 Federal Office Building, Spokane, Washington 99201
Wyoming	P. O. Box 340, Casper, Wyoming 82602

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department af Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resaurces, Water Resources Service, Parliament Building, Victoria, British Columbia

USDA-SCS-PORTLAND, OREG. 1966

WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES

Including Columbia River Drainage in Canada

ISSUED

MARCH 1, 1968

The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation, Corps of Engineers, Forest Service, National Park Service, Weather Bureau, Geological Survey, and other Federal Agencies, Departments of State Government, Irrigation Districts, Power Companies, and others.

The Department of Water Resources coordinates snow surveys in California.

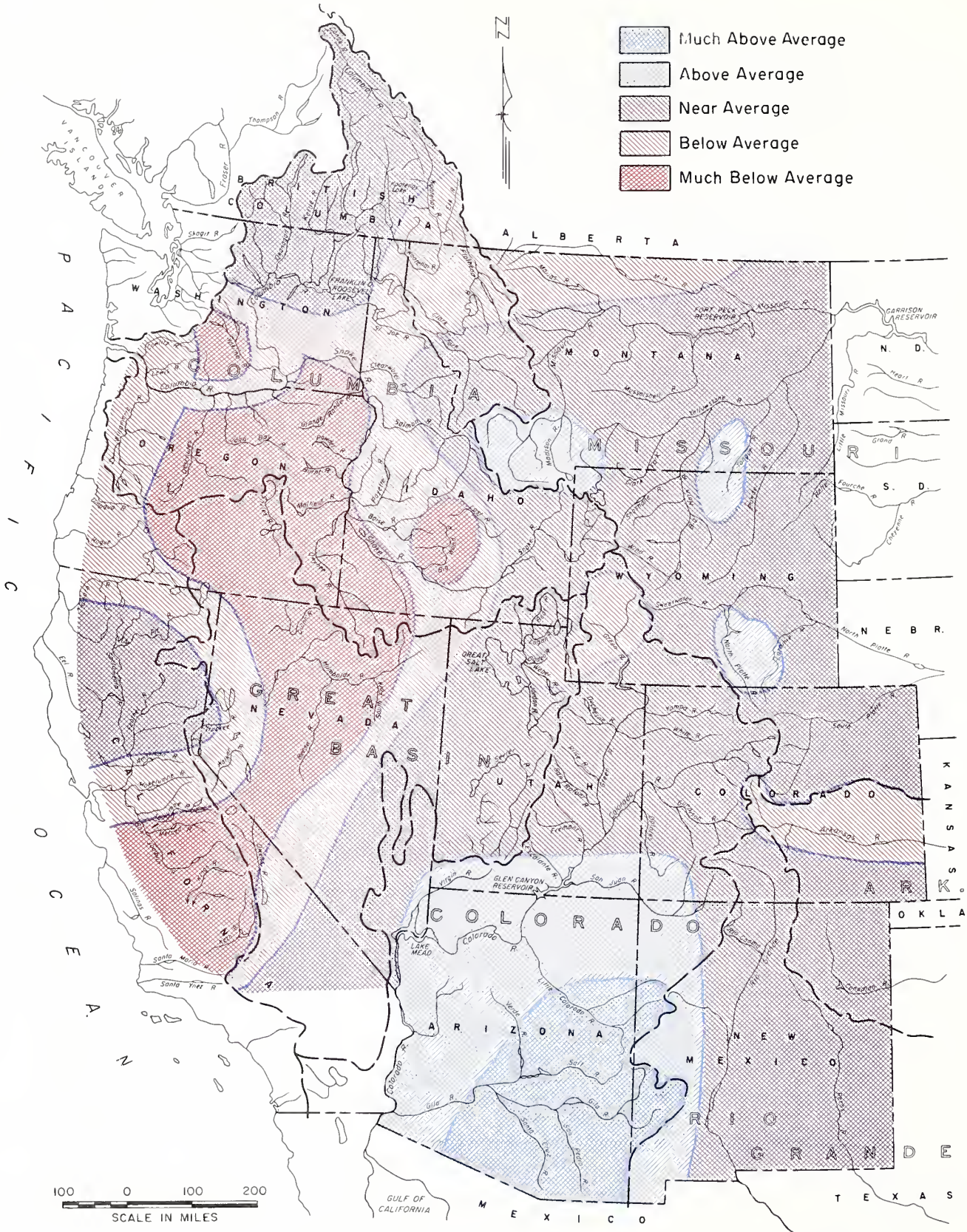
The Water Resources Service, Department of Lands, Forests, and Water Resources directs snow surveys in British Columbia.

This report was prepared by the Water Supply Forecasting Branch, Engineering Division, Soil Conservation Service, from data supplied by Snow Survey Supervisors of the Soil Conservation Service in the States of Alaska, Arizona, Colorado and New Mexico, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

Data from California was supplied by the Chief, Water Supply Forecast and Snow Survey Unit, Department of Water Resources.

Data from British Columbia was supplied by the Chief, Hydrology Division, Water Investigations Branch, Department of Lands, Forests and Water Resources.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
D. A. WILLIAMS, ADMINISTRATOR



1968 SNOWMELT SEASON

PROSPECTIVE STREAMFLOW

AS OF MARCH 1, 1968

WATER SUPPLY OUTLOOK

1968 SNOWMELT SEASON
AS OF MARCH 1, 1968

WATER SUPPLY FOR IRRIGATION PURPOSES WILL BE REASONABLY SATISFACTORY FOR MOST AREAS OF THE WEST. SHORTAGES ARE IN PROSPECT FOR AREAS OF OREGON AND SOUTHWEST IDAHO. LACK OF SNOWFALL IN WEST COAST RANGES HAS REDUCED SNOWPACK TO MUCH LESS THAN AVERAGE. SNOWMELT RUNOFF IN ARIZONA WILL BE HIGH.

Prospects of streamflow from snowmelt in western states is highly varied for 1968. In general, seasonal snowfall to date has been near average in Rocky Mountain states. Snow accumulation to date has been deficient in Nevada and the west coast states of Washington, Oregon and California. The deficiency on some watersheds in Oregon will likely result in short water supplies for some two-thirds of the irrigated area of the state. On the other extreme, surface water supplies in Arizona will be much above average as a result of storms in early winter. Another area of above average snowfall is on the tributaries to the Missouri River in southwest Montana.

The 1967 water year was one of excessive streamflow, particularly in the Columbia Basin and from the Sierras of California. In these areas, the excessive streamflow maintained or improved the favorable carryover storage picture that existed a year ago. This above average storage situation extends to a lesser degree to the Continental Divide area of Montana and western Wyoming and to the larger streams of the intermountain area of Idaho and Utah.

This storage assures a reasonably good water supply for irrigation areas served by the reservoirs. Where below average flows are in prospect as shown on the streamflow prospects map, areas without storage can expect shortages.

A third year of extremely favorable surface water supplies is in prospect for Arizona. A heavy snowfall in December caused high runoff and improved reservoir storage to a slightly better position than a year ago - nearly three times average. Streamflow during January and February has been high. Heavy snow remains at higher elevations.

There was a general improvement in snowpack on the Upper Colorado River basin in February to the point where inflow to Lake Powell is expected to be near average. Storage in major reservoirs remains about the same as a year ago. The heaviest snowpack is on the San Juan with some deficiency on the Green River in Wyoming.

East of the Continental Divide, slightly above average flows are expected for the Missouri and Yellowstone rivers. Less than average flows are in prospect for the Big Horn Mountains streams where heavy snowfall has occurred near the Montana border. There was some improvement in snowpack on the North and South Platte watersheds in February, bringing forecasts of streamflow up to above average. Storage carryover and prospective streamflow will meet normal demands in these areas in Colorado, Wyoming and Nebraska.

Lack of storage and continued deficiency in mountain snowpack indicates a probability of water shortage along the Arkansas in Colorado. Snowpack in the Rio Grande drainage is near average, but storage continues to be extremely deficient.

The California Department of Water Resources reports that with below normal precipitation during the past month, the fifth sub-normal February in as many years, normal snowpack accumulation was not realized. Thus the April-July runoff potential is less than that reported one month ago. Storage in major reservoirs is still above normal in all areas. Present forecasts of runoff for the coming irrigation season will require prudent water management to meet all demands, especially in the San Joaquin Valley.

Snowfall in the Upper Columbia in Canada and western Montana has been near average and much less than during the 1967 season. Streamflow in the Canadian section of the basin is expected to be near average. The deficiency of snowfall in the Snake River and lower basin watersheds reduces the prospective snowmelt season flow at The Dalles to 85 to 90 percent of average.

SUMMARY OF SNOW WATER EQUIVALENT MEASUREMENTS MARCH 1, 1968

MAJOR BASIN AND SUB—WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
MISSOURI BASIN		
Jefferson	110	120
Madison	95	110
Gallatin	115	145
Missouri Main Stem	95	125
Yellowstone	95	125
Shoshone	80	75
Wind	90	100
North Platte	95	105
South Platte	130	105
ARKANSAS BASIN		
Arkansas	112	100
Canadian	190	105
RIO GRANDE BASIN		
Rio Grande (Colo.)	100	95
Rio Grande abv. Otowi Bridge	105	90
Pecos	230	120
COLORADO BASIN		
Green (Wyo.)	85	90
Yampa - White	90	105
Duchesne	70	80
Price	85	75
Upper Colorado	95	100
Gunnison	105	100
San Juan	110	100
Dolores	120	130
Virgin	170	115
Gila	1000	200
Salt	1000	210
GREAT BASIN		
Bear	90	90
Logan	80	85
Ogden	95	85
Weber	95	95
Provo - Utah Lake	90	95
Jordan	100	90
Sevier	160	115
Walker - Carson	55	70
Tahoe - Truckee	70	80
Humboldt	25	35
Lake Co. (Oregon)	55	60
Harney Basin (Oregon)	40	45
UPPER COLUMBIA BASIN		
Columbia (Canada)	80	110
Kootenai	60	80
Clark Fork	90	100
Bitterroot	85	95
Flathead	65	85
Spokane	65	60
Okanogan	90	100
Methow	100	110
Chelan	90	90
Wenatchee	80	65

MAJOR BASIN AND SUB—WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
SNAKE BASIN		
Snake above Jackson, Wyo.	85	90
Snake above Hiese, Idaho	90	95
Snake abv. American Falls Res.	85	95
Henry's Fork	75	95
Southern Idaho Tributaries	85	80
Big and Little Wood	75	80
Boise	65	65
Owyhee	20	20
Payette	75	75
Malheur	70	55
Weiser	90	100
Burnt	70	65
Powder	70	65
Salmon	85	85
Grande Ronde	40	30
Clearwater	75	75
LOWER COLUMBIA BASIN		
Yakima	65	55
Umatilla	30	20
John Day	50	40
Deschutes	55	60
Crooked	25	20
Hood	35	35
Willamette	50	45
Lewis	60	65
Cowlitz	60	60
PACIFIC COASTAL BASIN		
Puget Sound	50	50
Olympic Peninsula	70	70
Umpqua - Rogue	60	55
Klamath	60	55
Trinity	100	90
CALIFORNIA CENTRAL VALLEY		
Upper Sacramento	65	80
Feather	75	90
Yuba	80	85
American	70	75
Mokelumne	75	75
Stanislaus	65	65
Tuolumne	80	75
Merced	90	75
San Joaquin	60	65
Kings	55	60
Kaweah	60	60
Tule	65	50
Kern	50	70

Data for California Watersheds supplied by Dept. of Water Resources, and for British Columbia Watersheds by Dept. of Lands, Forests and Water Resources.

Average is for 1948-62 period . California averages are for 1931-1960.

Based on Selected Snow Courses determined by Distribution within the Basin, Length of Record and Repetitive Monthly Measurement Schedules.

MISSOURI BASIN

Except for the northern tributaries to the Missouri main stem, snow cover is above average. A small area of record to near record high snowpack now exists on the Gallatin River drainage and on small tributaries south of Helena. Late season irrigation supplies from natural streamflow are expected to be near or above average. Below average flows are confined to the northwest drainages of the Sun, Teton, Marias and Milk Rivers, but reservoir storage will be adequate to meet most irrigation demands. The flow of the Yellowstone will be above average near its source and near average below the confluence with the Bighorn.

Forecasts of the Bighorn and its tributaries is slightly less than average with above average flows from streams coming from the north end of the Big Horn mountains. Storage is near average and a year ago at this time. Water supplies should be satisfactory.

Inflow to the major reservoir system on the North Platte is now expected to be above average. Similar flows are in prospect for the Laramie. Storage and streamflow are expected to be adequate to meet the demand, but reservoir storage will continue much below capacity.

The South Platte drainage in Colorado has good carryover storage in Colorado-Big Thompson, municipal and private irrigation reservoirs. This storage, along with near average snowmelt season streamflow, should be adequate to meet normal demands. As with other areas of the Missouri Basin, much of the snowfall season is ahead. However, an extreme deficiency in snowfall would be required to result in a serious shortage of water.

ARKANSAS BASIN

As of March 1, there is a definite prospect of surface water shortage along the Arkansas River and its southern tributaries. Forecasts of streamflow range near three-quarters of average and storage in reservoirs is low. Much more precipitation is needed to assure an adequate water supply this year.

For the Canadian in New Mexico, near average snowmelt flow is expected. Storage in Conchas reservoir is below average, but will meet minimum irrigation needs. Any excess of water depends on spring and summer rainfall.

RIO GRANDE BASIN

While streamflow prospects are for slightly above average flows and well above that for 1967, water supply outlook along the Rio Grande in New Mexico is only fair. Reservoir storage in major conservation reservoirs is well below average, but comparable to recent years. Total surface water supply will continue to be much less than demands. Additional storms are needed. Water supply outlook along the Pecos is near average and above that of the Rio Grande.

For the San Luis Valley of Colorado near average water supplies are expected. Valley soil moisture is reported as good. Reservoir storage is slightly deficient.

COLORADO BASIN

Total effective snowpack in the upper Colorado River basin is near average as of March 1. The greatest deficiencies are on the Green River and its tributaries in Wyoming and Utah. Near average flows are expected on the Colorado and its principal tributaries in western Colorado. Snowfall in excess of average has occurred on the San Juan and Dolores watersheds of southwestern Colorado at the edge of heavy December storms centered in Arizona. Storage in Lake Powell and major irrigation reservoirs in the upper basin has increased slightly over a year ago with an equivalent decrease in Lake Mead. Storage in smaller irrigation reservoirs in Colorado and Utah tends to be above average. Snowmelt season flow into Lake Powell is forecast at near average for this date.

With practically no snowfall in Arizona since December, the snowpack continues to gradually decline. The snowmelt at low and medium elevations has resulted in heavy runoff and a near maximum of record water in storage as of this date. Snowpack at high elevations remains at several times average. Melt is expected to be gradual, but total flow for the next three months is expected to be from 130 to over 200 percent of average. Mountain soils are wet. This is the third year of well above average surface water supply for the Arizona Central Valley.

GREAT BASIN

For the Utah section of the Great Basin, the combination of streamflow and holdover

SELECTED STREAMFLOW FORECASTS APRIL-SEPTEMBER 1968 as of MARCH 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
	1967	1968	
UPPER MISSOURI			
Jefferson at Sappington, Montana		1150	118
Madison near Grayling, Montana 1/	586	500	119
Gallatin near Gateway, Montana		630	141
Missouri near Zortman, Montana 2/		4900	108
Sun at Gibson Dam, Montana 3/	747	520	85
Marias near Shelby, Montana 4/	791	500	77
Milk near Eastern Crossing, Montana		220	81
Yellowstone at Livingston, Montana		2330	109
Shields at Clyde Park, Montana		125	126
Clark Fork at Chance, Montana		638	109
Shoshone, Inflow to Buffalo Bill Res., Wyo.		839	105
Wind at Dubois, Wyoming		90	93
Bull Lake near Lenore, Wyoming		150	87
Tensleep near Tensleep, Wyoming	61	68	94
Yellowstone at Miles City, Montana 5/		6100	105
Missouri near Williston, N. Dakota 6/		11500	104
PLATTE			
North Platte at Saratoga, Wyoming		735	126
Laramie near Jelm, Wyoming 7/		137	122
Clear at Golden, Colorado		144	107
St. Vrain at Lyons, Colorado		85	106
Cache LaPoudre near Fort Collins, Colorado 8/		200	109
ARKANSAS			
Arkansas at Salida, Colorado 9/		275	80
Purgatoire at Trinidad, Colorado		40	90
RIO GRANDE			
Rio Grande near Del Norte, Colorado 10/		520	105
Conejos near Mogote, Colorado 11/		190	97
Rio Chama near LaPuente, New Mexico		190	89
Rio Grande at Otowi Bridge, New Mexico 12/(Mar-July)		650	107
Pecos at Pecos, New Mexico *		68	128
UPPER COLORADO			
Colorado near Granby, Colorado 13/		250	107
Colorado near Glenwood Springs, Colorado 14/		1600	103
Roaring Fork at Glenwood Springs, Colorado 15/		800	105
Gunnison at Grand Junction, Colorado		1350	103
Dolores at Dolores, Colorado		330	127
Colorado near Cisco, Utah	2241	4200	111
Green below Flaming Gorge Res., Utah 16/**	1516	900	80
Yampa at Steamboat Springs, Colorado		320	110
White at Meeker, Colorado		332	100
Duchesne near Tabiona, Utah 17/		110	96
Rock Creek near Mountain Home, Utah		93	91
Price near Scofield, Utah 18/		37	100
Green at Green River, Utah 16/**	3494	3050	91
San Juan, Inflow to Navajo Res., N.M.**		720	104
Animas at Durango, Colorado		530	116
San Juan near Bluff, Utah 19/	762	1285	110
Colorado, Inflow to Lake Powell, Arizona 20/	6045	8000	104
LOWER COLORADO			
Gila near Solomon, Arizona (Mar-May)	21	196	250
Salt at Intake, Arizona (Mar-May)	47	450	200
Verde above Horseshoe Dam, Arizona (Mar-May)	40	150	130

SELECTED STREAMFLOW FORECASTS APRIL-SEPTEMBER 1968 as of MARCH 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
GREAT BASIN	1967	1968	
Bear at Harer, Idaho		250	97
Logan near Logan, Utah 21/	151	110	83
Ogden, Inflow to Pine View Res., Utah 22/**	138	82	71
Weber near Oakley, Utah	167	120	98
Inflow to Utah Lake, Utah		275	98
Big Cottonwood near Salt Lake City, Utah	45	36	92
Beaver near Beaver, Utah	30	24	99
South Fork Humboldt near Elko, Nevada	72	30	50
Humboldt at Palisades, Nevada	200	75	43
Truckee at Farad, California 25/	550	242	90
East Carson near Gardnerville, Nevada	309	140	78
West Walker near Coleville, California	236	110	78
UPPER COLUMBIA			
Columbia at Revelstoke, British Columbia(Mar-Sept)	25228	21900	106
Kootenai at Wardner, British Columbia (Mar-Sept)	5612	4150	88
Kootenai at Leonia, Idaho	10045	7550	81
Flathead near Columbia Falls, Montana 26/	6972	5540	84
Flathead near Polson, Montana 26/	7687	6540	83
Clark Fork above Missoula, Montana	2061	1970	107
Bitterroot near Darby, Montana	575	560	96
Clark Fork at Whitehorse Rapids, Montana 26/		12560	87
Columbia at Birchbank, British Columbia 26/	51557	43680	97
Spokane at Post Falls, Idaho 27/		2500	73
Columbia at Grand Coulee, Washington 26/	73507	64630	92
Okanogan near Tonasket, Washington	1818	1860	95
Chelan at Chelan, Washington 28/	1366	1310	97
Wenatchee at Peshastin, Washington	1700	1550	81
SNAKE			
Snake above Palisades Res., Wyoming 29/		2370	94
Snake near Heise, Idaho 29/	4120	3700	96
Henry's Fork near Rexburg, Idaho 30/		620	101
Big Lost near Mackay, Idaho 31/	291	165	108
Big Wood, Inflow to Magic Res., Idaho 32/	466	170	61
Bruneau near Hot Springs, Idaho		150	70
Owyhee Res., Net Inflow, Oregon	353	100	26
Boise near Boise, Idaho 33/	1419	1150	70
Malheur near Drewsey, Oregon		40	49
Payette near Horseshoe Bend, Idaho 34/	1788	1560	78
Snake at Weiser, Idaho		4500	65
Salmon at Whitebird, Idaho	7400	6250	90
Clearwater at Spalding, Idaho	8106	7700	84
LOWER COLUMBIA			
Grande Ronde at LaGrande, Oregon	155	50	25
Yakima at Cle Elum, Washington 35/		670	64
Deschutes at Benham Falls, Oregon 36/		408	65
Columbia at The Dalles, Oregon 26/	108327	95650	88
Hood near Hood River, Oregon 36/		239	63
Willamette at Salem, Oregon 36/		4000	72
Lewis at Ariel, Washington 37/		1260	87
Cowlitz at Castle Rock, Washington	2436	2510	85

SELECTED STREAMFLOW FORECASTS APRIL-SEPTEMBER 1968 as of MARCH 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
	1967	1968	
NORTH PACIFIC COASTAL			
Dungeness near Sequim, Washington		140	79
Rogue at Raygold, Oregon	898	750	75
Klamath Lake, Net Inflow, Oregon	607	390	61
CALIFORNIA CENTRAL VALLEY 38/**			
Sacramento, Inflow to Shasta, California	2760	1680	96
Feather near Oroville, California	3042	1650	89
Yuba at Smartville, California	1734	950	87
American, Inflow to Folsom Res., Calif.	2302	1000	75
Cosumnes at Michigan Bar, California	333	105	82
Mokelumne, Inflow to Pardee Res., Calif.	831	300	65
Stanislaus, Inflow to Melones Res., Calif.	1340	450	63
Tuolumne, Inflow to Don Pedro Res., Calif.	2175	830	70
Merced, Inflow to Excheque Res., Calif.	1232	400	67
San Joaquin, Inflow to Millerton Lake, Calif.	2327	760	65
Kings, Inflow to Pine Flat Res., California	2277	720	63
Kaweah, Inflow to Terminus Res., California	609	155	59
Tule, Inflow to Success Res., California	164	30	54
Kern, Inflow to Isabella Res., California	924	290	69

Forecasts in California provided by Department of Water Resources.
Average is for 1948-62 period except California. California is computed for 1916-65 period.
Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.
** April - June Period ** April - July Period*

storage is expected to provide a fair to good water supply for most irrigated areas of the state. Snowfall has been slightly below average in the northern valleys from Ogden to the Idaho border. The Little Bear River in Cache Valley has the poorest outlook with two-thirds of average flow in prospect. If snowfall for the remainder of the season is near average, streams in southern Utah will have above average flows during the snowmelt season. This area gained from being on the edge of heavy December storms in northern Arizona.

Water supply outlook declined substantially in Nevada during February. Forecasts of flow of the Humboldt are down to one-half of average and less for the upper Owyhee. Storage on these northern Nevada streams is also less than average.

Water supply outlook is better on the east slope of Sierra streams. Even with the general lack of snowfall in February, streamflow forecasts remain at 80 to 90 percent of average for the April-July period. Carryover storage is high. The combination of storage and streamflow will provide an adequate water supply for areas served by reservoirs on the Truckee, Walker and Carson Rivers. Soils tend to be wet at mountain elevations. The general lack of snowfall in the northwest extends over the Great Basin area of Oregon.

COLUMBIA BASIN

The principal water producing areas of the

basin in Canada and western Montana have a near normal snow accumulation to date. Less than average snowpack exists on the Snake River and its major tributaries in northern Idaho. An extreme deficiency in snowpack was measured over all of Oregon, the southern half of Washington and southwestern Idaho, including adjacent areas of Nevada. Current streamflow is above average because of warm temperatures over the basin in recent weeks.

The British Columbia Water Resources Service reports that flows of the Upper Columbia and Okanogan in Canada will be near average with somewhat less flow in prospect for the Kootenai. Streamflow will be much less than in the high runoff year of 1967.

In western Montana, snowpack as of March 1 is below average except for the Upper Clark Fork and Blackfoot Rivers where snowpack is near or slightly above average. Soils are well primed due to rainfall and early season snowmelt. Streamflow is forecast to be well below that of last year except for the Upper Clark Fork and Bitterroot, where flows are expected to be near those of a year ago.

Watershed snow conditions improved slightly in Washington during February for streams flowing east into the Columbia from the Wenatchee River north to the border. In other areas of the state there was a general deterioration of snowpack during the month. Streamflow has been well above average and soils are generally wet, particularly in the southwest. Water supply outlook is good with well above average storage in all irrigation reservoirs.

Water supply outlook in Idaho is satisfactory although most streamflow forecasts are for slightly below average flows for the snowmelt season. February was an unusually warm month, but intervening storms between warm periods provided a near average increment to the snowpack. Soil moisture at lower and northern elevations is unusually favorable.

There is substantial carryover storage from 1967 for the major irrigated areas along the Snake and Boise Rivers. Areas of possible shortage include the Lost and Wood River areas north of the Snake and streams in Elmore, Owyhee and Twin Falls Counties south of the Snake. These latter streams have low storage capacity and need at least normal spring precipitation to avoid a critically low water supply in 1968.

Water shortages are in prospect for much of Oregon. About two-thirds of the irrigation lands, with no access to stored water, will have from one-third to two-thirds of a normal water supply. The remainder, with access to stored water, will have a reasonably adequate supply if water is carefully used.

Water content of mountain snowpacks, greatly reduced by warm temperatures and direct rainfall during February, varies from near one-quarter of average in southeastern Oregon to near two-thirds of average in southwestern Oregon and the Wallowa region in the Northeast.

Storage is slightly above average of a year ago, partly due to relatively heavy runoff during February.

ALASKA

Unseasonably warm weather late in February caused much of the low elevation snow in the Matanuska and Copper Valleys to melt. Effects of the warm weather were felt as far north as the Tanana drainage where several snow courses lost snow water equivalent in the past month.

Greater than normal snow cover was measured throughout most of interior Alaska. The Chena River watershed near Fairbanks received heavy snowfall early in the winter. Recent snowfall has been light, but the snowpack is substantially above normal on most of the Tanana and Chena drainages.

Much of the winter precipitation in southeast Alaska came as rain. Snow cover in that region is generally less than average.

Soil moisture is deficient and much of the present snowpack will be used to replace moisture in the soil.

CALIFORNIA

The California Department of Water Resources, coordinating agency for snow surveys in California, reports that above normal temperatures and below normal precipitation during February has reduced the spring runoff potential from that reported last month. With the warm storms California received during February being generally restricted to the north of a line between San Francisco Bay and Lake Tahoe, watersheds of the San Joaquin Valley suffered most from this fifth consecutive below normal February. Present conditions on San Joaquin watersheds indicate that the spring runoff will be about 65 percent of normal, similar to that experienced during the 1963-64 water year. Here, as elsewhere in the state, storage in major reservoirs is well above normal for this date and ground water levels are reflecting

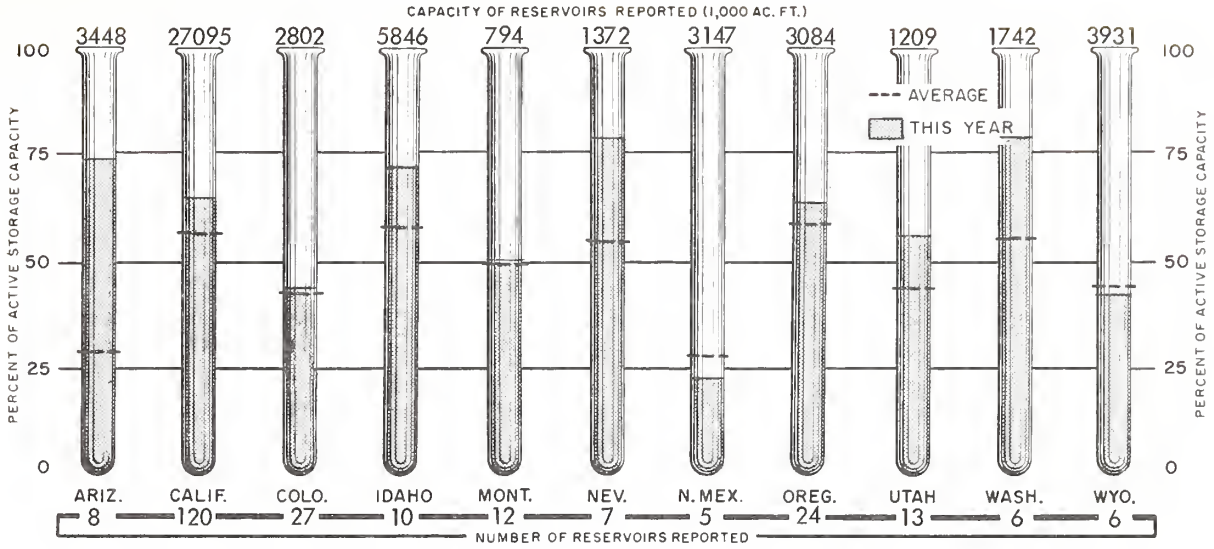
STORAGE IN LARGE RESERVOIRS MARCH 1, 1968

BASIN AND NAME OF RESERVOIR	CAPACITY (1000 A.F.)	STORAGE (1000 A.F.)
UPPER MISSOURI		
Boysen	560	336
Buffalo Bill	373	131
Canyon Ferry	2043	1663
Hebgen	377	237
Tiber	1316	431
Yellowtail	1356	774
Belle Fourche	185	124
Keyhole	340	126
Fort Peck	19410	15970
Fort Randall	5800	3520
Garrison	24500	17990
Oahe	23600	19814
Big Bend	1900	1718
PLATTE		
Glendo	786	379
Pathfinder	1011	376
Seminoe	982	230
City of Denver	588	427
Colo-Big Thompson (4)	865	383
ARKANSAS		
Conchas	280	184
John Martin	367	39
RIO GRANDE		
Elephant Butte	2207	343
El Vado	194	1
UPPER COLORADO		
Flaming Gorge	3789	2078
Navajo	1709	588
Powell	28040	8201
Blue Mesa	941	354
LOWER COLORADO		
Havusu	619	537
Mead	27207	14416
Mohave	1810	1637
San Carlos	1206	532
Salt River Res. (4)	1755	1549
Verde River Res. (2)	323	257
GREAT BASIN		
Bear	1421	1092
Lahontan	287	246
Rye Patch	172	60
Sevier Bridge	236	83
Strawberry	265	127
Tahoe	732	610
Utah	1149	746

BASIN AND NAME OF RESERVOIR	CAPACITY (1000 A.F.)	STORAGE (1000 A.F.)
UPPER COLUMBIA		
Chelan	676	437
Coeur d'Alene	238	340
Flathead	1791	1087
Hungry Horse	2982	2097
Kootenay	673	482
Pend Oreille	1155	604
Roosevelt	5232	2347
LOWER COLUMBIA		
Cougar	155	73
Detroit	299	194
Hills Creek	200	107
Lookout Point	337	140
Yakima Res. (5)	1066	989
SNAKE		
American Falls	1700	1294
Arrowrock	287	278
Anderson Ranch	423	275
Brownlee	980	620
Cascade	653	308
Jackson	847	606
Lucky Peak	278	80
Palisades	1202	975
Owyhee	715	437
PACIFIC COASTAL		
Clair Engle	2448	1978
Clear Lake	440	213
Nacimiento	350	202
Ross	1202	1228
"pper Klamath	584	449
CALIFORNIA CENTRAL VALLEY		
Almanor	1036	762
Berryessa	1602	1600
Folsom	1010	724
Isabella	570	203
McClure	1026	639
Millerton	521	221
Oroville	3484	1065
Pine Flat	1013	707
Shasta	4500	3536

Reservoir Storage Data Provided by Bureau of Reclamation, Corps of Engineers, Geological Survey, and water using organizations. Data from California and British Columbia provided by Department of Water Resources and Department of Lands, Forests and Water Resources, respectively.

RESERVOIR STORAGE AS OF MARCH 1, 1968



last season's wet conditions. Thus, considering all factors, the state's water supply will be adequate to meet most demands this spring and summer. However, prudent water management will be required in most areas.

Precipitation in California during the past month was 75 percent of normal, with northern California, central California and southern California receiving 100 percent, 60 percent and 20 percent, respectively, of February normals. For central valley tributaries, the distribution ranged from 100 percent of normal for the Yuba River basin to 40 percent of normal for the Kings River basin. Temperatures were above normal throughout the State during February. By mid-month most areas were experiencing positive departures of nearly 10 degrees from normal, with many stations showing record and near record daily highs.

California's snowpack water content on March 1 was 75 percent normal on central valley watersheds. The water content of the pack ranged from 90 percent of normal on the Feather River basin to 50 percent of normal on the Tule River basin. The snow line elevation on March 1 ranged from 6,000 feet to 7,000 feet, as opposed to the 1,600 feet to 3,000 feet reported for February 1.

Runoff forecasts for the April-July period, based upon normal precipitation during the remainder of the season for central valley tributaries, ranged from 96 percent of normal for the Upper Sacramento Valley basin in the north to 54 percent of normal for the Kaweah River basin in the south. In general, these forecasts are lower than those published one month ago due to the below normal precipitation and above normal temperatures during February.

Unimpaired runoff of California's major streams during February was about 135 percent of normal. This high runoff during a relatively dry month was brought about by the unseasonable early snowmelt throughout the state. The extent of the snowmelt contribution to the runoff during February is best seen by comparing runoff values in percent of normal for low and high elevation areas as follows: San Francisco Bay area (58) vs. Sacramento Valley (139) and Central Coastal area (15) vs. San Joaquin Valley (86). For the period October through February, unimpaired runoff for the state was 90 percent of normal. Streams tributary to the Sacramento and San Joaquin Valley were 92 percent and 74 percent of normal, respectively, for this period.

Water stored in 120 major California reservoirs with a combined capacity of 27,100,000 acre-feet was 16,990,000 acre-feet, about 115 percent of normal for this date. This is 1,808,000 acre-feet more than was in storage one year ago. Central Valley reservoirs store 13,016,000 acre-feet of this amount, 115 percent of normal for this date. Most major reservoirs in the Central Valley are now storing as much water as possible and safely retain flood control reservations.

EXPLANATION of STREAMFLOW FORECASTS

All flows are observed flows except as adjusted for: 1/ Change in storage in Hebgen Lake. 2/ Change in storage in Canyon Ferry and Tiber reservoirs. 3/ Change in storage in Gibson Reservoir and measured diversions. 4/ Change in storage in Two Medicine, Four Horns and Lake Francis reservoirs. 5/ Change in storage in Boysen and Buffalo Bill reservoirs.

6/ Change in storage in Boysen, Buffalo Bill, Canyon Ferry, Tiber, and Fort Peck reservoirs. 7/ Plus diversions to Cache la Poudre. 8/ Minus diversions from North Platte, Laramie, and Colorado rivers plus measured diversions above station. 9/ Change in storage in Twin Lakes and Sugar Loaf reservoirs minus diversions from Colorado River.

10/ Change in storage in Rio Grande, Santa Maria, and Continental reservoirs. 11/ Change in storage in Platoro Reservoir. 12/ Change in storage in El Vado Reservoir. 13/ Change in storage in Granby Reservoir plus diversions to Cache la Poudre and through Adams Tunnel. 14/ Changes as indicated in (13) plus Moffatt Tunnel diversion. 15/ Plus diversions to Arkansas River.

16/ Change in storage in Flaming Gorge and Big Sandy reservoirs. 17/ Plus diversion through Duchesne Tunnel. 18/ Change in storage in Scofield Reservoir. 19/ Change in storage in Navajo Reservoir. 20/ (Lee's Ferry) Change in storage in Flaming Gorge, Navajo, Lake Powell, and Big Sandy reservoirs.

21/ Plus Utah Power and Light Company tailrace and Logan, Hyde Park, and Smithfield canals. 22/ (Inflow record computed by U. S. Bureau of Reclamation.) 23/ Plus diversion by Weber-Provo Canal and change in storage in Wanship Reservoir. 24/ Change in storage in Deer Creek Reservoir, minus diversions through Duchesne Tunnel and Weber-Provo Canal, plus diversion through Salt Lake City Aqueduct. 25/ Change of storage in Lake Tahoe and Boca Reservoir. (Forecast by Truckee Basin Committee)

26/ Change in storage in any of these reservoirs above the station: Kootenai Lake, Hungry Horse, Flathead Lake, Pend Oreille Lake, F. D. Roosevelt Lake, Lake Chelan, Coeur d'Alene Lake, Brownlee and Noxon; and pumpage at Roosevelt Lake. 27/ Changes in storage in Coeur d'Alene Lake and diversions by Spokane Valley Farms Company and Rathdrum Prairie canals. 28/ Change in storage in Lake Chelan. 29/ Changes in storage for Jackson Lake and Palisades Reservoir above stations. 30/ Change in storage in Henry's Lake, Island Park and Grassy Lake reservoirs and diversions between Ashton and Rexburg.

31/ Change in storage in Mackay Reservoir, and diversion in Sharp Ditch. 32/ (Combined flow Big Wood River nr. Bellevue and Camas Creek nr. Blaine.) 33/ Change in storage in Arrowrock, Anderson Ranch, and Lucky Peak. 34/ Change in storage in Cascade and Deadwood reservoirs. 35/ Change in storage in Keechelus, Kachess, and Cle Elum reservoirs plus diversion by Kittitas Canal. 36/ (Corrected to natural flow). 37/ Change in storage in Merwin, Yale, and Swift reservoirs. 38/ (Corrected for upstream impairments).

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